

Referring to the embodiment of the present invention shown in Figure 1, a program for implementing part of protocol layer functions is downloaded from a host computer 10 to each of a plurality of communication adapters 20 to 25, resulting in each communication adapter 20 to 25 acting as a layer control device that implements part of the protocol layer functions. For example, adapter 20 acts as a layer control device for implementing the function of the protocol layer of TCP/IP. The computer 10 acts as a layer control device for implementing the function of an upper layer in a protocol layer stack using an application program. The computer 10 and the adapters 20 to 25 are configured as a communication control device including a plurality of layer control devices that work together to support a communication protocol.

For example, if the protocol stack is defined as (1) application, (2) TCP/IP, (3) HDLC (UI), and (4) physical layer (ISDN), the application in the computer 10 sends data via the serial bus 16 (i.e., transmission line) to the communication adapter 20 that supports TCP/IP. After processing the data, the communication adapter 20 passes the processed data to the communication adapter 23 that supports HDLC (UI). The communication adapter 23 processes the data and passes the processed data to the communication adapter 25 that supports the physical layer (ISDN). Finally, the communication adapter 25 processes the data and sends the processed data on the ISDN.

The configuration of the present invention provides a communication control device that is capable of being flexibly changed without being affected by bus control or system changes of the computer.

The Burns reference provides a redundant device for a primary device connected to a serial bus segment, and switches to the redundant device according to the status of the primary device. Burns implements device redundancy using serial communications. Also, Burns implements serial bus redundancy by doubling serial bus segments and switching the segments according to the status of a serial bus.

The present invention implements a communication protocol by dividing the protocol into layers, such as TCP/IP, implementing each of the layers using individual controllers, and using a serial bus for communications between the protocol layers. Thus, the main objective of the present invention is not to provide redundancy, but to improve protocol change flexibility and reduce development time and effort.

While one aspect of the present invention relates to redundancy, the redundancy is not redundancy of an internal segment, but redundancy in the function of a protocol. For example, as illustrated in the embodiment of the present invention shown in Figure 7, the present invention switches a line from a leased line that is usually used, to an ISDN line, to back up the failed leased line.

Thus, it is submitted that Burns does not disclose a communication control device "wherein the communication control device dynamically assigns the part of the protocol layer functions to each of the layer control devices, and wherein the layer control devices supporting the respective part of the protocol layer functions perform respectively assigned processing tasks in sequence," as claimed in the present invention.

Claims 2-7 depend from claim 1 and are patentable over the prior art for at least the reasons discussed above.

Therefore, Applicant submits that claims 1-7 patentably distinguish over the prior art. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejections under §§ 102 and 103.

New Claim

Claim 8 is newly added with this response to alternatively define the present invention. Claim 8 recites "dividing a communication protocol into protocol layers; dynamically assigning the protocol layers to the respective layer control devices; ... and performing operations of the assigned protocol layer, by the layer control devices, in sequence." These features are not taught or suggested by the cited reference. Thus, for at least the reasons presented above, Applicant submits claim 8 patentably distinguishes over the prior art. Accordingly, Applicant respectfully requests allowance of the new claim.

Request for Return of Form PTO-1449

On March 23, 2000, Applicant filed an Information Disclosure Statement with a Form PTO-1449. A copy of this form has not yet been returned to the Applicant to confirm that the references cited therein have been considered. Accordingly, it is requested that the Examiner

confirm consideration of these references by initialing and returning this 1449 form. For convenience, a copy of the 1449 form is attached to this request.

CONCLUSION

In accordance with the foregoing, it is respectfully submitted that all outstanding rejections have been overcome and/or rendered moot, and further, that all pending claims patentably distinguish over the prior art. Thus, there being no further outstanding rejections, the application is submitted to be in condition for allowance, which action is earnestly solicited.

If there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

Finally, if there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

Please **AMEND** the following claims:

1. (ONCE AMENDED) A communication control device comprising:
a plurality of layer control devices, each implementing part of protocol layer functions
and together supporting a communication protocol; and
a transmission line [for] interconnecting [said] the plurality of layer control devices to
enable data communication between [said] the layer control devices,
wherein the communication control device dynamically assigns the part of the protocol
layer functions to each of the layer control devices, and
wherein the layer control devices supporting the respective part of the protocol layer
functions perform respectively assigned processing tasks in sequence.

Please **ADD** the following new claim:

8. (NEW) A method of controlling communications using a plurality of layer control
devices and a transmission line, the method comprising:
dividing a communication protocol into protocol layers;
dynamically assigning the protocol layers to the respective layer control devices;
interconnecting the layer control devices using the transmission line, the layer control
devices communicating with one another over the transmission line; and
performing operations of the assigned protocol layer, by the layer control devices, in
sequence.